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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/804,379	03/19/2004	Oleg Kolosov	1012.188 (SMX6014.1-2003-	7238
45735	7590	06/21/2006	EXAMINER	
SENNIGER POWERS (SMX) ONE METROPOLITAN SQUARE 16TH FLOOR ST. LOUIS, MO 63102			CHRISTENSEN, RYAN S	
			ART UNIT	PAPER NUMBER
			2856	

DATE MAILED: 06/21/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

14A

**Office Action Summary**

Application No.

10/804,379

Applicant(s)

KOLOSOV ET AL.

Examiner

Ryan Christensen

Art Unit

2856

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 3/19/2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 22-30 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 22-30 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 March 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date 11/04/2004.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Drawings*

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "318," "624." Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: "618." Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of

an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "464" has been used to designate both "a trench" and "second layer". Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

### ***Specification***

The disclosure is objected to because of the following informalities: On page 7, referring to Figures 5a-5d the "free portion" is designated with the character reference "214." This appears to be a typographical error because there is no character reference "214," in Figure 5. There is however a character reference "314."

Appropriate correction is required.

***Claim Objections***

Claim 30 is objected to because of the following informalities: In line 6 the word "for" is repeated. This appears to be a typographical error. Appropriate correction is required.

***Claim Rejections - 35 USC § 112***

Claim 30 recites the limitation "the flexural resonator" in line 7. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claim 30 is rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent 6,269,686 (Hahn et al.).

With respect to claim 30, Han et al. disclose a resonator sensor for analyzing fluid (abstract), having a resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) with a sensing surface for exposure to the fluid (bending reed, 1, Fig.1 and Col. 2, lines 41-65), the resonator being affixed to a platform (11 and 12, Fig. 1) with a spaced relationship between the exposed surface and the platform (Fig. 1), a support disposed between the platform and resonator (substrate, 10), a conductive path (4 and 5 Fig. 1) for receiving a response signal (Col. 2, lines 60-65) from the flexural resonator. Figure 2 illustrates that the recess (2, Fig. 1) cut from the substrate (10, Fig. 1) forms a housing comprising at least one wall that substantially surrounds the resonator while

maintaining the exposure of the sensing surface to the fluid (Fig. 2 and Col. 2, lines 60-65). Han et al. also disclose the piezoelectric resonator is excited electrically (Col. 2, lines 45-46). There is inherently a conductive path from a power source in order to excite the piezoelectric resonator. This path and power source constitutes a circuit for providing stimulus to the flexural resonator.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 22-24 are rejected under 35 U.S.C. 103(a) as being obvious over U.S. Patent 6,269,686 (Hahn et al.) in view of U.S. Patent 5,243,756 (Hamburgen et al.).

With respect to claim 22, Hahn et al. disclose a resonator sensor for analyzing a fluid (abstract), comprising an assembly (Fig. 1) an electronic component (integrated circuit, 17, Fig. 2) affixed a platform (11 and 12, Fig. 1) a resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) having a sensing surface for exposure to the fluid (bending reed, 1, Fig.1), the resonator being affixed to the platform with a spaced relationship between the sensing surface and the platform (spacing, 2, Fig. 1), the resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) being in electrical communication (4 and 5 Fig. 1) with the electronic component (integrated circuit, 17, Fig. 2 and Col. 6, lines 5-7).

Hahn et al. suggest coupling the integrated circuit to the substrate, but do not explicitly disclose a protective layer encapsulating at least a portion of the assembly. One of ordinary skill would look to the art of integrated circuits in order to operably attach the integrated circuit to the substrate of a sensor. They would find U.S. Patent 5,243,756 (Hamburgen et al.), which discloses an integrated circuit (22, Fig. 1) encapsulated in liquid (40, Fig. 1) within a housing (12, Fig. 1). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system taught by Hahn et al. by encapsulating the integrated circuit in order to prevent moisture from corroding contacts with the integrated circuit (Hamburgen, Col. 2, lines 43-51).

With respect to claim 23, Hahn et al. further disclose the resonator being a coated or uncoated flexural resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) and the flexural resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) and a conductive path (4 and 5 Fig. 1) from the flexural resonator (Piezoelectric resonator and bending reed, 13 and 1, Fig. 1) to the electrical component.

With respect to claim 24, Han et al. disclose the resonator being a flexural resonator so that its sensing surface can displace liquid in the sensors operation (Col. 2, lines 41-65).

Claims 25-27, 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 6,269,686 (Hahn et al.) in view of U.S. Patent 5,243,756 (Hamburgen et al.) as applied to claim 23 above, and further in view of U.S. Patent 6,494,079 (Matsiev et al.).

With respect to claim 25, Hahn et al. disclose a flexural resonator but do not expressly describe a tuning fork, in that the bending reed does not have at least two tines. However, U.S. Patent 6,494,079 (Matsiev et al.) disclose the use of mechanical resonators including tuning forks for measuring properties of fluids including viscosity (Col. 20, lines 31-42). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system taught by the combination as applied to claim 22 by using a mechanical resonator that is a tuning fork because there is improved linearity when measuring the viscosity of fluids (Mastiev, Col. 10, lines 31-42).

With respect to claim 26 the combination as applied to claim 25, further discloses the protective layer encapsulating the integrated circuit (Hamburgen et al., Fig. 1), leaving the sensing surface of the mechanical resonator exposed to the fluid.

With respect to claim 27, Hamburgen et al. further disclose an operating range from -40°C to 66°C.

With respect to claim 29, Han et al. disclose the recess (2, Fig. 1) being large enough so that the bending reed can freely vibrate. Further, figures 1 and 2 of Han et al. illustrate the spacing (recess, 2, Fig. 1) between the mechanical resonator (bending reed, which has been replaced with the tuning fork in the combination as applied to claim 26) and the platform (11 and 12, Fig. 1) is roughly as deep (Fig. 1) as the mechanical resonator is wide (Fig. 2).

Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over the combination of U.S. Patent 6,269,686 (Hahn et al.) in view of U.S. Patent 5,243,756



(Hamburgen et al.) and U.S. Patent 6,494,079 (Matsiev et al.) as applied to claim 26 above, and further in view of U.S. Patent 5,918,354 (Ikegami, et al.).

With respect to claim 28, the combination as applied to claim 26 does not explicitly disclose the sensing surface of the tuning fork resonator is coated with a support layer selected from a polymer, a ceramic, or combination thereof. However, Ikegami et al. disclose the sensing surface of the tuning fork resonator is coated with a support layer selected from a polymer (Col. 8, lines 41-56). It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the system taught by the combination as applied to claim 26 by coating the tuning fork with a polymer because it is well known in the art to do this for performance tuning.

#### ***Pertinent Prior Art***

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 5,644,273 (Kaida et al.) discloses a tuning fork type mechanical resonator where a portion is covered by a substrate for a protective layer.

U.S. Patent Publication 2002/0120296 (Mech et al.) discloses an integrated circuit on a sensor which is coated/encapsulated with a protective layer.

U.S. Patent 6,498,043 (Schulman et al.) discloses another sensor with an integrated circuit where the circuit is protected with a film and a portion is left exposed in order to make measurements or take readings.


**Conclusion**

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ryan Christensen whose telephone number is 571-272-2683. The examiner can normally be reached on Monday - Friday, 8am - 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Hezron Williams can be reached on 571-272-2208. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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